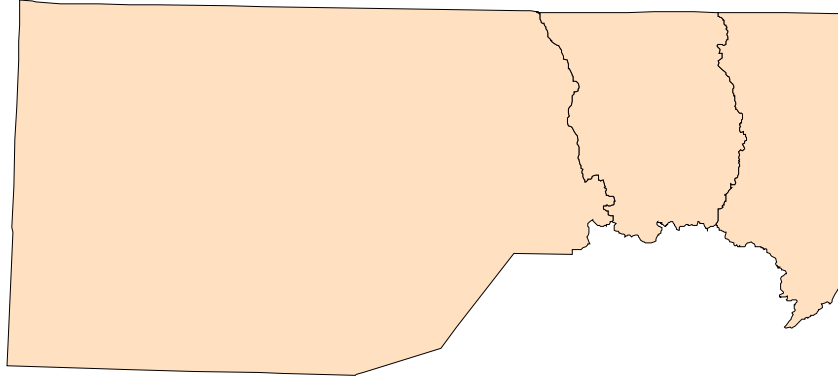
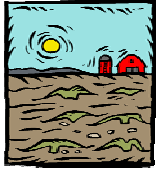


PART IV-BEAR RIVER DISTRICT ANNEX RISK ASSESSMENT





AGRICULTURAL RELATED HAZARDS

Background

Severe weather, drought, insect infestation and invasive noxious weeds have all had significant harmful impacts on the agricultural industry in the Bear River District. While these factors also impact the general public, the negative impacts are most acutely experienced by those in the agricultural sector. The agricultural sector is critical to the economies of Box Elder, Cache and Rich Counties. In Cache and Rich Counties the agricultural sector generates the greatest share of output to there respective county's economy.

History of Severe Weather in the Bear River District

Table IV-2: Prolonged Periods of Drought in the Region		
Box Elder County	Cache County	Rich County
1900-1903	1900-1903	1900-1903
1953-1960	1933-1935	1931-1935
1976-1977	1959-1961	1976-1979
1989-1992	1987-1992	1987-1992
1999-present	1999-present	1999-present
Palmer Drought Severity Index Chart from 1895-2001		

Table IV-3: History of Severe Weather Events in Box Elder County (1960-1999)			
Date	Severe Weather Event	Date	Severe Weather Event
April 1962	Wind	July 1982	Wind
October 1962	Wind	April 1983	Wind
November 1964	Wind	April 1986	Wind
September 1995	Hail, Lightning, Severe Storm/Thunder Storm, Winter Weather	December 1990	Sever Storm/Thunder Storm, Wind
March 1967	Wind, Winter Weather	January 1991	Fog
April 1967	Wind	January 1993	Winter Weather
June 1969	Hail, Wind	February 1996	Winter Weather
December 1970	Winter Weather	March 1996	Winter Weather
February 1971	Wind	November 1996	Winter Weather
August 1971	Sever Storm/ Thunder Storm	December 1996	Winter Weather
March 1973	Winter Weather	January 1997	Winter Weather
November 1973	Wind	February 1997	Winter Weather
March 1974	Wind, Winter Weather	March 1997	Winter Weather
April 1974	Wind, Winter Weather	April 1997	Winter Weather
March 1975	Winter Weather	October 1997	Winter Weather
April 1975	Winter Weather	November 1997	Winter Weather
May 1975	Winter Weather	December 1997	Winter Weather
July 1975	Winter Weather	January 1998	Winter Weather
November 1975	Winter Weather	February 1998	Winter Weather
December 1975	Winter weather	March 1998	Winter Weather

**Table IV-3: History of Severe Weather Events in Box Elder County
(1960-1999)**

Date	Severe Weather Event	Date	Severe Weather Event
February 1976	Wind, Winter Weather	April 1998	Winter Weather
March 1976	Wind, Winter Weather	June 1998	Winter Weather
April 1976	Wind, Winter Weather	November 1998	Winter Weather
June 1976	Winter	December 1998	Winter Weather
August 1978	Hail, Severe Storm/Thunder Storm, Wind	January 1999	Winter Weather
January 1979	Winter Weather	April 1999	Winter Weather
May 1979	Hail, Wind	December 1999	Winter Weather
July 1981	Lightning		

Source: National Climatic Data Center (<http://www.ncdc.noaa.gov/oa/ncdc.html>)

**Table IV-4: History of Severe Weather Events in Cache County
(1960-1999)**

Date	Severe Weather Event	Date	Severe Weather Event
June 1960	Hail, Frost	April 1990	Severe Storm/ Thunder Storm, Winter Weather
April 1962	Wind	December 1990	Severe Storm/Thunder Storm, Wind
November 1964	Wind	January 1991	Fog, Winter Weather
September 1965	Hail, Lightning, Severe Storm/Thunder Storm, Winter Weather	May 1991	Wind
March 1967	Wind, Winter Weather	January 1993	Winter Weather
April 1967	Wind	January 1993	Winter Weather
January 1971	Winter Weather	February 1996	Winter Weather
February 1971	Winter Weather	March 1996	Winter Weather
July 1971	Hail	October 1996	Winter Weather
August 1971	Severe Storm/Thunder Storm	November 1996	Winter Weather
December 1972	Wind, Winter Weather	December 1996	Winter Weather
November 1973	Wind	January 1997	Winter Weather
December 1973	Avalanche, Winter Weather	February 1997	Winter Weather
January 1974	Winter Weather	March 1997	Winter Weather
March 1975	Winter Weather	April 1997	Winter Weather
November 1975	Winter Weather	October 1997	Winter Weather
December 1975	Winter Weather	November 1997	Winter Weather
February 1976	Winter Weather	December 1997	Winter Weather
April 1976	Wind	January 1998	Winter Weather
June 1976	Winter Weather	February 1998	Winter Weather
November 1978	Winter Weather	March 1998	Winter Weather
November 1979	Winter Weather	April 1998	Winter Weather
January 1980	Wind	June 1998	Winter Weather
August 1980	Hail	November 1998	Winter Weather
July 1981	Lightning	December 1998	Winter Weather
April 1983	Wind	January 1999	Winter Weather
March 1984	Wind	April 1999	Winter Weather
July 1986	Sever Storm/Thunder Storm, Wind	December 1999	Winter Weather
September 1989	Tornado		

Source: National Climatic Data Center (<http://www.ncdc.noaa.gov/oa/ncdc.html>)

Table IV-5: History of Severe Weather Events in Rich County (1954-1999)			
Date	Severe Weather Event	Date	Severe Weather Event
May 1954	Tornado	March 1997	Winter Weather
April 1962	Wind	May 1997	Winter Weather
September 1965	Hail, Lightning, Sever Storm/Thunder Storm, Winter Weather	October 1997	Winter Weather
March 1967	Wind, Winter Weather	November 1997	Winter Weather
January 1971	Winter Weather	December 1997	Winter Weather
December 1972	Wind, Winter Weather	January 1998	Winter Weather
March 1975	Wind, Winter Weather	February 1998	Winter Weather
November 1975	Winter Weather	March 1998	Winter Weather
December 1975	Winter Weather	April 1998	Winter Weather
July 1981	Lightning	June 1998	Winter Weather
December 1990	Severe Storm/thunder Storm, Wind	November 1998	Winter Weather
January 1991	Winter Weather	December 1998	Winter Weather
February 1996	Winter Weather	January 1999	Winter Weather
November 1996	Winter Weather	April 1999	Winter Weather
December 1996	Winter Weather	December 1999	Winter Weather
January 1997	Winter Weather		
February 1997	Winter Weather		
Source: National Climatic Data Center (http://www.ncdc.noaa.gov/oa/ncdc.html)			

Table IV-6: Bear River District Grasshopper Infested Acreage (1998-2002)					
County	1998	1999	2000	2001	2002
Box Elder	100,000	100,000	55,000	120,400	120,000
Cache	0	0	19,000	64,500	17,000
Rich	0	0	0	12,400	0
Source: 2002 Insect Report, Utah Department of Agriculture and Food					

Table IV-7: Bear River District Mormon Cricket Infested Acreage (1998-2002)					
County	1998	1999	2000	2001	2002
Box Elder	0	0	0	0	108,300
Cache	0	0	19,000	8,100	4,400
Rich	0	0	0	0	0
Source: 2002 Insect Report, Utah Department of Agriculture and Food					

Regional Hazard Assessment

Drought Hazard Profile	
Frequency	Frequent
Severity	Severe mostly for agricultural producers
Location	Un-irrigated areas are most impacted
Seasonal Pattern	Water supply dependent on winter snowfall. Summer is when impact is realized.
Duration	As many as 10 years
Speed of Onset	Incremental with impact increasing
Probability of Future Occurrences	High-the region is one of the worst drought cycles in many years.

Severe Weather Hazard Profile	
Frequency	Frequent
Severity	Severe mostly for agricultural producers
Location	Everywhere (Some areas have more inherent risk due to geographic conditions)
Seasonal Pattern	Summer severe thunderstorms/hail & wind, Late spring freezing, and heavy winter storms
Duration	Days
Speed of Onset	Immediate
Probability of Future Occurrences	High

Insect Infestation Hazard Profile	
Frequency	Sporadic
Severity	Severe mostly for agricultural producers
Location	Everywhere
Seasonal Pattern	Spring & early summer
Duration	Months
Speed of Onset	Days
Probability of Future Occurrences	High

The State of Utah is currently in the fifth year of a drought. While data has not yet been compiled, 2003 is shaping up to be one of the worst insect infestation years in recorded history. All three counties have been declared agricultural disaster areas by the U.S. Department of Agriculture. Certainly, the drought cycle has exacerbated the insect infestation problem.

Severe weather can potentially impact agricultural crop production. Increased risks are associated with certain times in the crop growth cycle. These vary depending on the crop. In general, many crops can be damaged by heavy rainstorm, hail or high winds. Unusually late frost can damage some crops. Fruit production located mostly in Eastern Box Elder County can be significantly damaged by late frosts as well as other severe weather.

Assessing Vulnerability: Identifying Assets & Estimating Losses

Table IV-8: Bear River District 1997 Agriculture Economic Profile				
County	Number of Farms	Acres in Farm	Market Value of Ag products sold	Estimated Average Value of land & building (per farm)
Box Elder	1,077	523,744	\$102,173,000	\$547,243
Cache	1,232	266,374	\$104,809,000	\$329,665
Rich	162	1,357,734	\$15,538,000	\$853,906
Source: 1997 Census of Agriculture, U.S. Department of Agriculture				

Although the final tally has not been compiled, to-date the USDA Crop Insurance Program has paid out a total of \$13.2 Million in disaster assistance to farmers in Box Elder, Cache and Rich Counties for 2001-2002. Since payouts only represent a portion of actual damages, it is estimated that actual damages for 2001-2002 were over \$26 Million from severe weather, insect infestation and drought in the Bear River District (Phone conversations with Box Elder, Cache and Rich Farm Services Agency, USDA).

Assessing Vulnerability: Analyzing Development Trends

The urbanization of eastern Box Elder County and the Cache Valley means access to irrigation water for agricultural purposes will become increasing more difficult. In terms of competition for limited water resources, agricultural uses often lose out to increasing urban demands. This problem is likely to get worst for agricultural users and especially becomes evident during a drought period such as the one we are currently experiencing. Even today some rumblings of legal action have occurred between urban users and agricultural users.